CARGILL
SALT DIVISION

916 S. Riverside Ave.
St. Clair, MI 48079-5335
810/326-2700

May 15, 2001

Dermott Courtney
Underground Injection Control Section
U. S. Environmental Protection Agency Region 2
290 Broadway
New York, New York 10007-1866

Ref: UIC Permit NYU105431

Dear Mr. Courtney:

Mechanical integrity demonstrations were performed on three wells at our Watkins Glen, New York salt production facility. Water-brine interface tests were used to demonstrate the integrity of Wells 23 and 24 in accordance with the subject permit. The demonstrations were successful, and the wells have been returned to service. In the case of Well 23, we attempted to perform the test while other wells in the gallery remained in leaching service, but this caused the cavern pressures and average brine salinity to fluctuate enough to prevent a valid test from being performed. The test was repeated with all wells in the gallery out of service, with good results.

Well 22 has had almost no cavern space created; it has only operated 9 days to date. The wellbore was intended to coalesce with the lateral Well 19 borehole, which connects Wells 20, 21, 23, and 24, but it was drilled too far away, and has not connected with the cavern. Because of its small size and isolation from the rest of the wells, a hydrostatic pressure test was used to demonstrate the integrity of Well 22. Well 22 will be leached with a recently installed hanging tubing in an attempt to connect it with the main cavern.

Reports on the demonstrations are enclosed. If you have any questions, please call me at 810-326-2762, or fax to 810-329-3328.

Sincerely,

Michael J. Schumacher
Solution Mining Manager

enclosures

cc: G. Meyer
R. Nemecek, NYSDEC

Cargill Salt
Watkins Glen, NY
Mechanical Integrity Test
Well no 22
3-May-2001

Pressure	Time	Date	Pressure	Time	Date	Pressure	Time	Date	Pressure	Time	Date
496.2125	11:10:30	5/3/01	489.4827	11:28:30	5/3/01	483.3904	11:46:30	5/3/01	477.6570	12:04:29	5/3/01
496.0208	11:11:00	5/3/01	489.3118	11:29:00	5/3/01	483.2276	11:47:00	5/3/01	477.4967	12:05:00	5/3/01
495.8193	11:11:31	5/3/01	489.1436	11:29:30	5/3/01	483.0669	11:47:29	5/3/01	477.3458	12:05:30	5/3/01
495.6208	11:12:01	5/3/01	488.9665	11:30:01	5/3/01	482.9005	11:48:00	5/3/01	477.1944	12:05:59	5/3/01
495.4265	11:12:31	5/3/01	488.7927	11:30:31	5/3/01	482.7332	11:48:30	5/3/01	477.0431	12:06:29	5/3/01
495.2347	11:13:00	5/3/01	488.6188	11:31:00	5/3/01	482.5698	11:49:00	5/3/01	476.8806	12:07:00	5/3/01
495.0437	11:13:30	5/3/01	488.4482	11:31:30	5/3/01	482.4073	11:49:29	5/3/01	476.6833	12:07:30	5/3/01
494.8446	11:14:01	5/3/01	488.2775	11:32:00	5/3/01	482.2389	11:50:00	5/3/01	476.5738	12:07:59	5/3/01
494.6543	11:14:31	5/3/01	488.0957	11:32:31	5/3/01	482.0779	11:50:30	5/3/01	476.4249	12:08:29	5/3/01
494.4650	11:15:00	5/3/01	487.9186	11:33:00	5/3/01	481.9169	11:51:00	5/3/01	476.2662	12:09:00	5/3/01
494.2758	11:15:30	5/3/01	487.7448	11:33:30	5/3/01	481.7558	11:51:29	5/3/01	476.1206	12:09:30	5/3/01
494.0879	11:16:00	5/3/01	487.5712	11:34:00	5/3/01	481.5944	11:51:59	5/3/01	475.9746	12:09:59	5/3/01
493.8931	11:16:31	5/3/01	487.3932	11:34:31	5/3/01	481.4259	11:52:30	5/3/01	475.8284	12:10:29	5/3/01
493.7092	11:17:01	5/3/01	487.2203	11:35:00	5/3/01	481.2657	11:53:00	5/3/01	475.6795	12:10:59	5/3/01
493.5252	11:17:30	5/3/01	487.0514	11:35:30	5/3/01	481.1054	11:53:29	5/3/01	475.5240	12:11:30	5/3/01
493.3415	11:18:00	5/3/01	486.8793	11:36:00	5/3/01	480.9516	11:53:59	5/3/01	441.2832	12:11:59	5/3/01
493.1490	11:18:31	5/3/01	486.7121	11:36:30	5/3/01	480.7877	11:54:30	5/3/01	367.4930	12:12:29	5/3/01
492.9624	11:19:01	5/3/01	486.5416	11:37:00	5/3/01	480.6316	11:55:00	5/3/01	263.2943	12:12:59	5/3/01
492.7766	11:19:30	5/3/01	486.3776	11:37:30	5/3/01	480.4746	11:55:30	5/3/01	94.5181	12:13:30	5/3/01
492.5908	11:20:00	5/3/01	486.2114	11:38:00	5/3/01	480.3191	11:55:59	5/3/01	13.6688	12:13:59	5/3/01
492.4086	11:20:30	5/3/01	486.0441	11:38:30	5/3/01	480.1546	11:56:30	5/3/01	13.6656	12:14:29	5/3/01
492.2163	11:21:01	5/3/01	485.8715	11:39:01	5/3/01	479.9937	11:57:00	5/3/01	13.6822	12:14:59	5/3/01
492.0283	11:21:31	5/3/01	485.7050	11:39:30	5/3/01	479.8344	11:57:30	5/3/01	14.1771	12:15:29	5/3/01
491.8452	11:22:00	5/3/01	485.5387	11:40:00	5/3/01	479.6741	11:57:59	5/3/01	14.1732	12:15:59	5/3/01
491.6483	11:22:30	5/3/01	485.3730	11:40:30	5/3/01	479.5172	11:58:29	5/3/01			
491.4786	11:23:00	5/3/01	485.2076	11:40:59	5/3/01	479.3530	11:59:00	5/3/01			
491.2930	11:23:31	5/3/01	485.0361	11:41:30	5/3/01	479.2007	11:59:30	5/3/01			
491.1149	11:24:00	5/3/01	484.8720	11:42:00	5/3/01	479.0462	11:59:59	5/3/01			
490.9366	11:24:30	5/3/01	484.7074	11:42:30	5/3/01	478.8950	12:00:29	5/3/01			
490.7504	11:25:00	5/3/01	484.5441	11:43:00	5/3/01	478.7364	12:01:00	5/3/01			
490.5607	11:25:31	5/3/01	484.3726	11:43:30	5/3/01	478.5828	12:01:30	5/3/01			
490.3807	11:26:01	5/3/01	484.2101	11:44:00	5/3/01	478.4294	12:01:59	5/3/01			
490.2025	11:26:30	5/3/01	484.0459	11:44:30	5/3/01	478.2748	12:02:29	5/3/01			
490.0220	11:27:00	5/3/01	483.8831	11:45:00	5/3/01	478.1154	12:03:00	5/3/01			
489.8447	11:27:30	5/3/01	483.7195	11:45:29	5/3/01	477.9626	12:03:30	5/3/01			
489.6592	11:28:01	5/3/01	483.5517	11:46:00	5/3/01	477.8099	12:03:59	5/3/01			

Instrument: Paroscientific 760-900A, serial no. 42577 Casing 7",23lb/ft 2593' from GL

Result: Pressure change in last 60 minutes 20.3841 psig Total depth 2686' from GL

Percentage loss 4.1%

Person Conducting test: Michael J. Schumacher, Solution Mining Manager

CARGILL INCORPORATED
WATER-BRINE INTERFACE
MECHANICAL INTEGRITY TEST REPORT

Address

Cargill Salt
Watkins Glen Plant
518 E. 4th Street
Watkins Glen , New York 14891
(607) 535-6300

General Information

UIC Permit	**NYU105431**
Field	**Watkins Glen**
Test well	**23**
Reference well	**24**
Other wells in gallery	**19,20,21**
Test well location	**Lat. 42°-23'-05", Long. 76°-51'-46"**
	Watkins Glen, New York
API No.	**31-097-21631**
Test Date	**04-May-01**
Test fluid	**Water**
Result	**PASSED TEST**

Test well data

Well no.	**23**		
Depth of surface casing	**965**	ft.	**Drilling record**
Depth to top of salt formation	**1764**	ft.	**9/96 Gamma ray log**
Depth to top of cavern	**2082**	ft.	**11/00 gamma ray log**
Depth of production casing	**2381**	ft.	**9/98 Casing cut**
Depth of tubing (if present)	**none**	ft.	
Total depth	**2392**	ft.	**9/98 Gamma ray log**
Original total depth	**2684**	ft.	**Drilling record**
Outer diameter of production casing	**7**	in.	**Drilling record**
Outer diameter of tubing (if present)	**none**	in.	
Capacity of casing or annulus	**1.6535**	gpf	
Volume of casing or annulus	**3937**	gals.	
Normal operating pressure	**360**	psig	
Mode of last 24 hours of operation	**Water Injection**		

All depths referenced to wellhead , elev. 445

Reference well data

Well no.	**24**		
Depth of surface casing	**812**	ft.	**Drilling record**
Depth to top of salt formation	**1782**	ft.	**9/96 Gamma ray log**
Depth to top of cavern	**2503**	ft.	**9/98 Gamma ray log**
Depth of production casing	**2580**	ft.	**Drilling record**
Depth of tubing (if present)	**none**	ft.	
Total depth	**2560**	ft.	**9/98 Gamma ray log**
Original total depth	**2615**	ft.	**Drilling record**
Outer diameter of production casing	**7**	in.	**Drilling record**
Outer diameter of tubing (if present)	**none**	in.	
Capacity of casing or tubing	**1.6535**	gpf	
Volume of casing or tubing	**4266**	gals.	

All depths referenced to wellhead , elev. 445
7" casing is perforated from 2545'-2550'

Target Depth for Interface

Normally 50 feet above the end of the casing or the cavern roof, whichever is shallower

Depth **2032** ft.

Instrumentation

Well	Test	Reference
Manufacturer	**Paroscientific**	**Paroscientific**
Model	**760-900A**	**760-1K**
Serial No.	**42583**	**42954**
Accuracy	**0.01%**	**0.01%**
Precision	**0.001 psi**	**0.001 psi**

Preparation

If the casing of the test well was most recently used for brine production, flush with water to remove any crystallized salt.

Date and time test well was flushed **not flushed**

Approximate volume in gallons

Shut-in period with water in casing

Comments

Second date and time well was flushed

Approximate volume in gallons

Shut-in period with water in casing

Comments

The test well must be bled back to ensure that it is filled with a fluid of uniform density. Bleed back at least the volume of the casing or annulus.

Date test well was bled back **05/01/01**

Approximate volume in gallons **10,000**

Specific gravity of fluid **1.188**

Comments

The reference well must be bled back to ensure that it is filled with a fluid of uniform density. Bleed back at least the volume of the tubing or casing.

Date and time ref well was bled back **04/30/01**

Approximate volume in gallons **288,000** gals

Specific gravity of fluid **1.204**

Comments

Set Interface

Test fluid	**Water**
Specific gravity of test fluid	**1.000**
Specific gravity of brine	**1.188**

Calculate maximum permissible injection rate and target pressure differential.

Capacity of casing or annulus		Allowable velocity		Maximum inj. rate
1.6535 gpf	x	20 fpm	=	**33** gpm

Target interface depth x gradient diff. = target pressure diff.
2032 ft. x (1.188 - 1.000) X 0.433 = 165.4 psi

Date **05/01/01**	Time	Test Well	Ref. Well	Diff.	change in diff.
Pressures before injection	**16:08**	**99.247**	**82.625**	**16.622**	
Pressures during injection	**17:00**	**139.971**	**81.787**	**58.184**	**41.562**
Pressures during injection	**18:10**	**192.657**	**89.313**	**103.344**	**86.722**
Pressures after injection	**20:10**	**279.907**	**96.162**	**183.745**	**167.123**

All pressures measured in psia

Calculated final interface depth
167.123 psi / ((1.188 - 1.000) X 0.433) = 2053 ft.

Note : Approximately 3540 gallons injected, estimated from tank gauge.

Temperature Stabilization Period

	Date	Time	Test Well	Ref. Well	Diff.	change in diff.
Start Stabilization	**05/01**	**20:10**	**279.907**	**96.162**	**183.745**	
Inter. press	**05/02**	**11:25**	**310.495**	**125.110**	**185.385**	**1.640**
Inter. press	**05/02**	**15:10**	**313.816**	**128.595**	**185.221**	**1.476**
Start of test	**05/03**	**08:30**	**322.534**	**137.396**	**185.138**	**1.393**
Total time		**36** hrs.				

(Minimum time is 36 hours.)

The observed change in differential pressure does not indicate significant interface movement during this period.

First Test Period

	Date	Time	Test Well	Ref. Well	Diff.	change in diff.
Start of first test	**05/03**	**08:30**	**322.534**	**137.396**	**185.138**	
Inter. press	**05/03**	**10:30**	**323.273**	**138.358**	**184.915**	**-0.223**
Inter. press	**05/03**	**12:30**	**324.294**	**139.339**	**184.955**	**-0.183**
Inter. press	**05/03**	**14:30**	**325.215**	**140.271**	**184.944**	**-0.194**
End of first test	**05/03**	**16:30**	**325.789**	**141.075**	**184.714**	**-0.424**

Test Period **8** hrs
Average pressure change **-0.053** psi/hr

Maximum allowable pressure change is 0.05 psi/hr over 8 hours.

The first test was attempted while Wells 20 and 21, which are drilled into the gallery on opposite sides of Well 23, remained in operation. This resulted in fluctuating reference well pressures, along with some fluctuation in the average brine densities below the Well 23 and 24 casings. The test was repeated on the following day with all wells of the gallery closed in.

Second Test Period

	Date	Time	Test Well	Ref. Well	Diff.	change in diff.
Start of 2nd test	**05/04**	**08:30**	**326.674**	**142.551**	**184.123**	
Inter. press	**05/04**	**09:30**	**326.849**	**142.669**	**184.180**	**0.057**
Inter. press	**05/04**	**10:30**	**326.700**	**142.512**	**184.188**	**0.065**
Inter. press	**05/04**	**11:30**	**326.533**	**142.343**	**184.190**	**0.067**
Inter. press	**05/04**	**12:30**	**326.377**	**142.181**	**184.196**	**0.073**
Inter. press	**05/04**	**13:30**	**326.253**	**142.027**	**184.226**	**0.103**
Inter. press	**05/04**	**14:30**	**326.134**	**141.911**	**184.223**	**0.100**
Inter. press	**05/04**	**15:30**	**326.009**	**141.789**	**184.220**	**0.097**
End of 2nd test	**05/04**	**16:30**	**325.884**	**141.664**	**184.220**	**0.097**

Test Period **8** hrs
Average pressure change **0.012** psi/hr

The other wells in the gallery were closed in at 8:00 on 5/4/01. The reference well pressure and test well pressures both stabilized quickly. Test and reference well pressures were read simultaneously during both eight-hour test periods.

If the test was conducted in accordance with the method approved in the USEPA notice published in the Federal Register of August 18,1989, page 34169-34171 (as amended in Federal Register of November 14, 1989, page 47451) and the rate of pressure change during the test period was less than 0.05 psi/hour, the well has passed the test and demonstrated internal mechanical integrity.

Result : **PASSED TEST**

Person conducting test:

Michael J. Schumacher
Solution mining manager
Cargill Salt
916 S. Riverside Ave.
St. Clair, MI 48079
(810) 326-2762

Witnessing field personnel: **None**

Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for the submission of false information, including the possibility of fine and imprisonment for knowing violations.

Signature of owner/authorized agent : M Schumacher

Michael J. Schumacher
Solution mining manager
Cargill Salt
916 S. Riverside Ave.
St. Clair, MI 48079
(810) 326-2762

Attachments :

Field data sheets (1)
Gauge calibration certificates

FIELD DATA SHEET

TEST WELL 23 INSTRUMENT S/N 42583

REFERENCE WELL 24 INSTRUMENT S/N 42954

DATE	TIME	TEST PRESS.	REF PRESS.	DIFFERENCE	OPER. INIT.	REMARKS
5/1/01	16:08	99.2471	82.6253	16.622	MA	STATIC
	16:17					STARTED PUMPING WATER
	17:00	139.971	81.7872	58.184	MA	PUMPED 880 GALS STATIC
	18:10	192.657	89.3133	103.344	MA	PUMPED 1820 GALS STATIC
	19:00	234.660	90.4144	144.246	MA	PUMPED 2680 GALS STATIC
	20:10	279.907	96.1621	183.745	MA	PUMPED 3540 GALS STATIC
5/2/01	11:25	310.495	125.110	185.385	MA	TEMP STABILIZATION
	15:10	313.816	128.595	185.221	MA	" "
5/3/01	8:30	322.534	137.396	185.138	MA	START TEST
	10:30	323.273	138.358	184.915	MA	
	12:30	324.294	139.339	184.955	MA	
	14:30	325.215	140.271	184.944	MA	
	16:30	325.789	141.075	184.714	MA	
5/4/01	8:30	326.674	142.551	184.123	MA	RESTART TEST
	9:30	326.849	142.669	184.180	MA	WITH CAVERN SHUT IN
	10:30	326.700	142.512	184.188	MA	
	11:30	326.533	142.343	184.190	MA	
	12:30	326.377	142.181	184.196	MA	
	13:30	326.253	142.027	184.226	MA	
	14:30	326.134	141.911	184.223	MA	
	15:30	326.009	141.789	184.220	MA	
	16:30	325.884	141.664	184.220	MA	COMPLETE TEST